II. Remarks

Reconsideration and re-examination of this application in view of the above amendments and the following remarks is herein requested. Claims 1-3, 5, 7, 9, 11-13, and 16-24 were pending in the application, claims 4, 6, 8, 10, 14, and 15 had been cancelled, claims 12, 13, 16, and 17 had been withdrawn by the Applicant, and the Examiner has withdrawn claims 18-24. By this paper, claims 12, 13, 16, and 17 have been cancelled, claims 1 and 3 have been amended, and claims 25-30 have been added. Support for the above amendments may be found in Applicants' specification as originally filed.

Restriction

The Examiner has issued a restriction requirement between the following inventions under 35 U.S.C. § 121:

I. Claims 1-3, 5, 7, 9, 11, drawn to a system for estimating body states of a vehicle comprising, classified in class 701/4, 38; and

II. Claims 18-24, drawn to a system for estimating body states of a vehicle, comprising, classified in class 702/141, 142, 145, 147, 158.

Pursuant to 37 CFR § 1.142(b) and MPEP § 821.03, the Examiner has elected and examined Invention (I) above. Applicants note that the new claims added by this paper, claims 25-30, are dependent from claim 1, and therefore, the new claims are part of Invention (I).

Applicants respectfully traverse this restriction requirement. There are two criteria for a proper requirement for restriction between patentably distinct inventions:

(A) The inventions must be independent or distinct as claimed; and (B) there must be a serious burden on the Examiner if restriction is not required. MPEP § 803(I).

A. Independent or Distinct

The Examiner has stated that Inventions (I) and (II) above are related, but distinct inventions. However, "[r]elated inventions are distinct if the inventions *as claimed* are not connected in at least one of design, operation, or effect." MPEP § 802.01(II). The inventions of independent claims 1 and 18 are in fact connected in at least one of design, operation, or effect. In fact, Applicants respectfully assert that the inventions are connected in all three of design, operation, and effect, for the reasons stated below.

First, Inventions (I) and (II) are connected in design. Each of the independent claims of Inventions (I) and (II), claims 1 and 18, is directed toward a system for estimating body states of a vehicle, as the Examiner has noted in his definition of Inventions (I) and (II). Both claims recite a first linear accelerator and a second linear accelerometer mounted to the vehicle in separate locations from each other, the first and second linear accelerometers being configured to measure the acceleration of the of the vehicle in a first direction and generate measured first and second linear acceleration signals based on the acceleration of the vehicle in the first direction, the measured first and second linear acceleration signals defining a first set of linear acceleration signals. In addition, both claims recite a third linear accelerometer and a fourth linear accelerometer mounted to the vehicle in separate locations from each other, the third and fourth linear accelerometers being configured to measure acceleration of the vehicle in a second direction and generate measured third and fourth linear acceleration signals based on the acceleration of the vehicle in the second direction, wherein the second direction is different from the

first direction, the measured third and fourth linear acceleration signals defining a second set of linear acceleration signals. Furthermore, both claims recite a filter configured to process the first and second sets of linear acceleration signals to obtain at least one of a roll rate, a roll angle, and a yaw rate.

Although claim 1 recites a signal adjuster, and claim 18 does not recite a signal adjuster, claim 20 does recite a signal adjuster. Claim 20 depends from claim 18 and is part of Invention (II) as defined by the Examiner above. Thus, both inventions (I) and (II) include a signal adjuster configured to transform the first and second sets of linear acceleration signals from a sensor coordinate system to a body coordinate system associated with the vehicle.

Claim 18 gives further details about the filter than claim 1 does. However, claim 2 further defines the filter of claim 1. Thus, both Inventions (I) and (II) include a filter having a model of the vehicle dynamics and of the linear accelerometers.

Clearly, then, Inventions (I) and (II) substantially overlap in design and scope.

Second, the inventions have the same operation. They both measure first, second, third, and fourth acceleration signals and use those signals to generate at least one of a roll angle, a roll rate, and a yaw rate.

Third, the inventions result in the same effect. Both inventions use linear accelerometers, and filter having a model, to generate at least one of a roll angle, a roll rate, and a yaw rate. The resulting effect is a relatively inexpensive system for estimating body states of a vehicle, compared to industry standards. Typical systems that estimate body states require more expensive sensors, while Inventions (I) and (II) can generate at least one of a roll angle, a roll rate, and a yaw rate using linear accelerometers and a filter having a model of the accelerometers and the vehicle dynamics.

Essentially, Invention (II) is substantially similar to Invention (I), except that Invention (II) gives more details about the model that the filter uses to generate at least one of the roll angle, the roll rate, and the yaw rate. (These additional details are found in the specification as originally filed.) However, since Invention (II) is connected to Invention (I) in design, operation, and effect, and only one of these connections is required to show that a restriction requirement is improper, the present restriction requirement should be withdrawn.

Furthermore, claims 25-30 have been added, which depend from claim 1, and therefore, Applicants believe these claims to be part of Invention (I). These claims incorporate the additional details of Invention (II) into claim 1. Thus, it would be improper to restrict out Invention (II), as a divisional application of Invention (II) might result in a patent for the same invention as the present application, which is against public policy. *See MPEP § 803.01* ("IT STILL REMAINS IMPORTANT FROM THE STANDPOINT OF THE PUBLIC INTEREST THAT NO REQUIREMENTS BE MADE WHICH MIGHT RESULT IN THE ISSUANCE OF TWO PATENTS FOR THE SAME INVENTION.")

In addition to the above, it should be noted that in order "[t]o support a requirement for restriction between two or more related product inventions, ... both two-way distinctiveness and reasons for insisting on restriction are necessary." MPEP 806.05(j). For related product inventions, "the inventions are distinct if: (A) the inventions *as claimed* do not overlap in scope, i.e., are mutually exclusive; (B) the inventions *as claimed* are not obvious variants; and (C) the inventions *as claimed* are either not capable of use together or can have a materially different design, mode of operation, or effect." *Id.* This cannot be shown for Inventions (I) and (II) because these inventions *do* overlap in scope and they are not

mutually exclusive. In other words, Invention (I) could be used with the further details for the filter recited in Invention (II). "Mutually exclusive" means "being related such that each excludes or precludes the other." Merriam-Webster's Collegiate Dictionary 820 (Merriam-Webster, Incorporated 11th ed. 2005) (2003). Since Inventions (I) and (II) could be used together, they are not mutually exclusive. Since they are not mutually exclusive, the restriction requirement is improper and should be withdrawn.

Applicants note that because Inventions (I) and (II) cannot be shown to be independent and distinct, this is determinative and any further arguments about whether there is a serious burden to examine both inventions are unnecessary. However, for the sake of completeness, Applicants discuss below the issue of whether there is a serious burden to examine both Inventions (I) and (II) in the present patent application.

B. Serious Burden

Even if the Examiner is not convinced by the Applicants' arguments above, the Examiner should still withdraw the restriction requirement because there is no serious burden in examining both Inventions (I) and (II).

The Examiner may show a serious burden by appropriately explaining one of the following: separate classification thereof, a separate status in the art when they are classifiable together, or a different field of search. MPEP § 808.02. In this case, the Examiner has stated that a serious burden exists because one or more of the following reasons apply (a) the inventions have acquired a separate status in the art in view of their different classification; (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter; (c) the inventions require a different field of search (for example, searching different

classes/subclasses or electronic resources, or employing different search queries); (d) the prior art applicable to one invention would not likely be applicable to another invention; or (e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

"[T]he examiner, in order to establish reasons for insisting upon restriction, must explain why there would be a serious burden on the examiner if restriction is not required." MPEP § 808.02. In other words, the Examiner's showing must include an appropriate explanation of why the serious burden exists. *Id.* For the reasons stated below, Applicants respectfully submit that the Examiner has not met this burden.

1. Separate Classifications

Applicants respectfully assert that relying on separate classifications in this case is a sham, because either of Inventions (I) or (II) could have been classified in any of the classes and subclasses that the Examiner assigned to each invention.

More particularly, the class and subclasses identified by the Examiner for Invention (I) are: 701/4, 38, and Invention (II) could easily have been classified here as well. Class 701 is "Data Processing: Vehicles, Navigation, and Relative Location." Subclass 4 is "Attitude or attitude control or indication," indented under "Aeronautical vehicle" and "Vehicle control, guidance, operation, or indication." Subclass 38 is "Attitude change suppressive control (e.g., antiroll or antipitch)," indented under "Suspension control," "Vehicle subsystem or accessory control," and "Vehicle control, guidance, operation, or indication." Either of Inventions (I) and (II) could have been classified here, as both are usable in this application. As stated above, Invention (II) merely gives more definition to the model used in Invention (I)

Likewise, the class and subclasses identified for Invention (II) are: 702/141, 142, 145, 157, 158, and Invention (I) could easily have been classified here as well. Class 702 is "Data Processing: Measuring, Calibrating, or Testing." Subclass 141 is "Accelerometer," indented under "Measurement system." Subclass 142 is "Speed," indented under "Measurement system." Subclass 145 is "Rotational speed," indented under "Speed" and "Measurement system." Subclass 147 is "Specific mathematical operation performed," indented under "Rotational speed," "Speed," and "Measurement system." Subclass 158 is "Linear distance or length," indented under "Dimensional determination" and "Measurement system." Just as Invention (II) was classified in this class and subclasses, Invention (I) could have been classified here as well. At the very least, all of the subclasses mentioned so far would need to be searched for both inventions, because both inventions are connected in design, operation, and effect for the reasons stated above. For example, they contain many of the same elements, as mentioned above, with Invention (II) merely having more definition of the model to be used, although Invention (I) also somewhat defines the model in claim 2.

Since both Inventions (I) and (II) can be classified in any of the following classes: 701/4, 38, 702/141, 142, 145, 147, 158, merely choosing one of the classifications for one of the inventions and the other classification for the other invention does not add any serious burden to the examination of both inventions. If the Examiner seriously feels that this is a burden, then the Applicants respectfully submit that the Examiner has the option to classify both inventions in the same class, as he could have done in the first place.

2. Separate Status in the Art Due to Their Recognized Divergent Subject Matter

"Separate status in the art may be shown by citing patents which are evidence of such separate status, and also of a separate field of search." MPEP § 808.02. No patents were cited by the Examiner. A separate field of search has also not been defined by the Examiner. In fact, Applicants respectfully submit that the field of search would likely be the same for both inventions, and would at least include classes and subclasses 701/4, 38, 702/141, 142, 145, 147, 158. Furthermore, the Examiner has provided no explanation of how Inventions (I) and (II) provide "divergent subject matter." For the reasons stated above, Applicants respectfully submit that Inventions (I) and (II) do not have divergent subject matter, but they in fact are connected in design, operation, and effect. Since the Examiner did not provide the appropriate explanation about how the inventions could possibly have "separate status in the art due to their recognized divergent subject matter," this cannot be a reason that there is a serious burden for examining both inventions now.

3. Different Field of Search

As stated above, the Examiner has not identified a different field of search, and for the reasons stated above, the field of search would likely be the same for both inventions. Thus, the Examiner did not provide the appropriate explanation regarding why a different field of search would be required, so this cannot be a reason that there is a serious burden for examining both inventions now.

4. Prior Art Applicable to One Invention Would Not Likely Be Applicable to Another Invention

The Examiner has offered no explanation as to why prior art would be applicable to one invention but not the other. Since Invention (II) merely provides more detail than Invention (I), the opposite is likely to be true. In other words, any

prior art would likely be applicable to both inventions. Thus, the Examiner did not provide the appropriate explanation regarding why prior art applicable to one of the inventions would not be applicable to the other invention, and therefore, this cannot be a reason that there is a serious burden for examining both inventions now.

5. The Inventions Are Likely to Raise Different Non-Prior Art Issues Under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

Again, the Examiner has offered no explanation as to what these different "non-prior art issues" would be, and thus, this does not meet the Examiner's burden to provide an appropriate explanation of how this causes a serious burden for examining both inventions in the same application.

For at least these reasons, Applicants respectfully submit that no serious burden exists for examining Inventions (I) and (II). For these reasons, in addition to the reasons given above (that the Examiner also has failed to show that the inventions are related but distinct), Applicants respectfully request that the Examiner withdraw the restriction requirement and examine Inventions (I) and (II) now, rejoining claims 18-24 in this application.

Rejections Under 35 U.S.C. § 112

The Examiner has rejected claim 1 under 35 U.S.C. § 112, second paragraph, because the preamble recites "estimating" while the body of the claim does not state which element performs the "estimating." Although Applicants do not believe that the body of the claim is required to recite which element performs the "estimating," in the spirit of cooperation, Applicants have amended claim 1 to recite that the filter is an estimating filter. In view of the above, Applicants believe that claim 1 is now in condition for allowance and such action is respectfully requested.

The Examiner has rejected claim 3 under 35 U.S.C. § 112, second paragraph, as lacking antecedent basis for "the models" and "the vehicle dynamics." Therefore, claim 3 has been amended to depend from claim 2 instead of claim 1, such that antecedent basis is now provided. Applicants believe that this amendment corrects this issue and puts claim 3 in condition for allowance. Such action is respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 1-3, 5, 7, 9 and 11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Pub. No. 2005/0149240 to Tseng et al. (Tseng), in view of U.S. Pat. No. 6,732,033 issued to LaPlante et al. (LaPlante). This rejection is respectfully traversed.

Applicants respectfully assert that Tseng and LaPlante, even in combination, fail to teach each and every element of the invention as recited in currently amended claim 1. For example, independent claim 1, from which claims 2, 3, 5, 7, 9, and 11 depend, includes a filter configured to process at least one set of linear acceleration signals (that it receives from linear accelerometers measuring in the same direction) into at least one of a roll rate, a roll angle, and a yaw rate.

Tseng fails to teach, suggest, or disclose a filter configured to process a set of linear acceleration signals into at least one of a roll rate, a roll angle, and a yaw rate. To the contrary, Tseng's system uses a standard yaw rate stability control sensor set, which includes a lateral acceleration sensor, a yaw rate sensor, a steering angle sensor, and a wheel speed sensor, together with a roll rate sensor and a longitudinal accelerometer (p. 2, para. [0025]). These sensors make up a sensing system 16, which is coupled to a control system 18 (*Id.*). The system has several other

elements, which ultimately result determining the pitch and roll angles of the vehicle (p. 4, para. [0044]). None of the linear accelerometers disclosed in Tseng measure acceleration in the same direction, and therefore, it would be impossible for the filter to process the one linear acceleration signal in a given direction into one of a roll angle, a roll rate, or a yaw rate. At any rate, claim 1 requires that a set of linear acceleration signals in the same direction be processed into one of a roll angle, a roll rate, and a yaw rate. As one having ordinary skill in the art would understand, one cannot calculate a roll angle, a roll rate, or a yaw rate from a single linear acceleration signal in a given direction. Tseng determines at least one of a roll rate, a roll angle, and a yaw rate from angular rate sensors, which is typical in the art.

Applicants respectfully assert that LaPlante also lacks any teaching, suggestion, or disclosure of a filter configured to process a set of linear acceleration signals into at least one of a roll rate, a roll angle, and a yaw rate. Although LaPlante discloses first and second accelerometers 20, 22 configured to measure acceleration of the Sprung Mass (SM) and Unsprung Mass (USM) in a z-direction, there is no teaching of any filter that is configured to receive signals from the accelerometers of the SM and USM and process these signals into at least one of a roll rate, a roll angle, and a yaw rate.

In view of the foregoing, Applicants respectfully submit that even if Tseng and LaPlante were properly combinable, Tseng and LaPlante in combination fail to teach each and every element of the present invention, as set forth in claim 1. Again, more particularly, an element not taught, suggested, or disclosed in either Tseng or LaPlante is a filter configured to process a set of linear acceleration signals, the set being two linear acceleration signals in the same direction, into at least one of a roll angle, a roll rate, and a yaw rate. Accordingly, Applicants respectfully submit that

independent claim 1, and claims 2, 3, 5, 7, 9, and 11 dependent therefrom, are in condition for allowance, for at least these reasons. Therefore, reconsideration and withdrawal of the rejection is respectfully requested.

Claims 18-24

In the event that claims 18-24 are rejoined based on Applicants' arguments above with regard to the restriction requirement, these claims would be allowable for at least the reasons given above with respect to claims 1-3, 5, 7, 9, and 11. Furthermore, these claims would be allowable because they recite that the filter uses a model to generate at least one of a roll angle, a roll rate, and a yaw rate, the model being based in part on distances along at least one of an x-axis, a y-axis, and a z-axis from each of the linear accelerometers to at least one of a yaw axis and a roll axis of the vehicle. Neither Tseng nor LaPlante teaches, suggests, or discloses a filter employing a model based on distances from the linear accelerometers to at least one of the roll axis and the yaw axis of the vehicle. Therefore, claims 18-24 are also patentable over the art of record for at least these reasons.

New claims 25-30

New claims 25-30 depend generally from claim 1, and therefore, these claims are allowable for at least the reasons given above. In addition, these claims, similarly to claims 18-24, recite that the filter uses a model to generate at least one of a roll angle, a roll rate, and a yaw rate, the model being based in part on distances along at least one of an x-axis, a y-axis, and a z-axis from each of the linear accelerometers to at least one of a yaw axis and a roll axis of the vehicle. Therefore,

claims 25-30 would also be allowable for the additional reasons given above for claims 18-24.

Conclusion

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot, and that pending claims 1-3, 5, 7, 9, 11, and 18-30 as amended, are patentable. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections, as well as the restriction requirement. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned at (734) 302-6022.

Respectfully submitted,

November 3, 2008
Date

/Bonnie R. Shaw/
Bonnie R. Shaw (Reg. No. 60,493)